Evidence of Increasing Specific Absorption Downwind of Mexico City

How does α_{abs} change as the Mexico City plume is transported downwind?

J. Christopher Doran, J.C. Barnard, Jerome D. Fast

ASP Annual Meeting, Sante Fe, New Mexico, February 28, 2009

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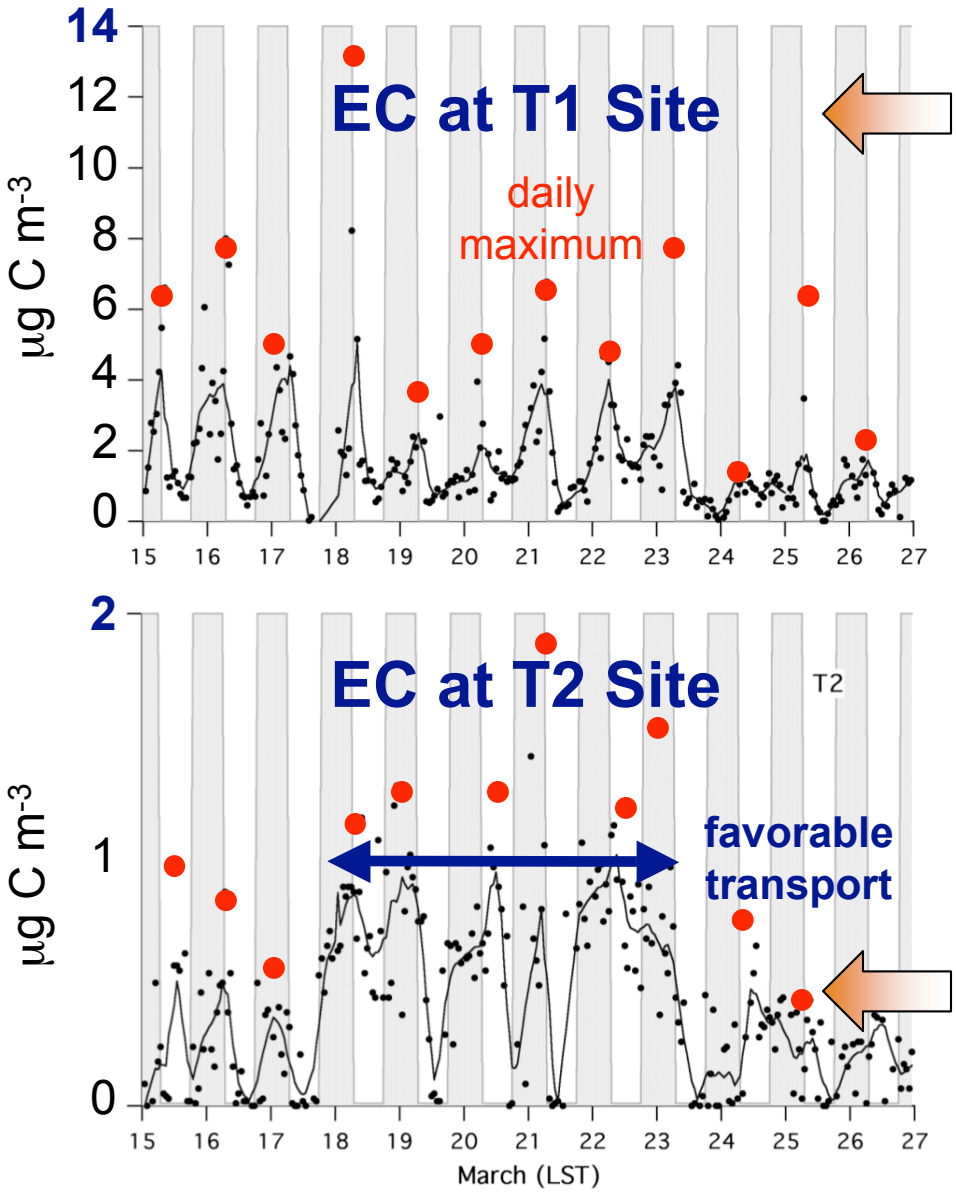
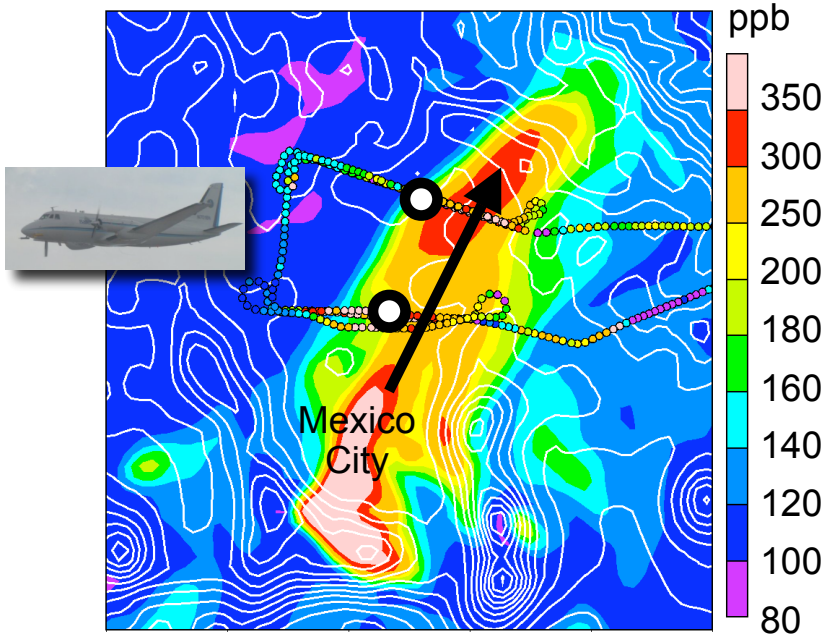
Elemental Carbon



Strong diurnal variations due to local emissions – but cannot easily identify transport from Mexico City

Predicted CO 21 UTC, March 20



Multi-day variations more evident further downwind

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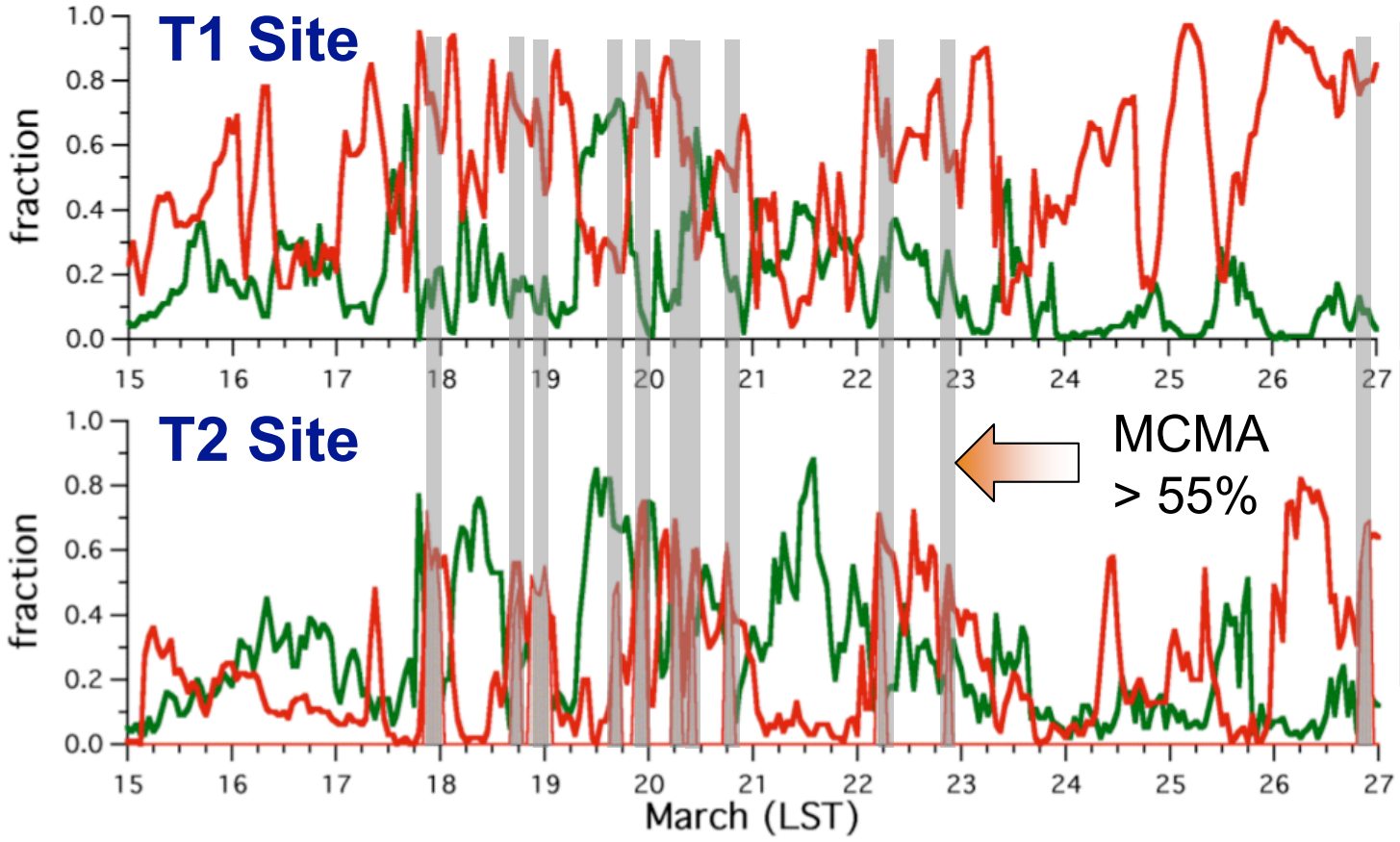
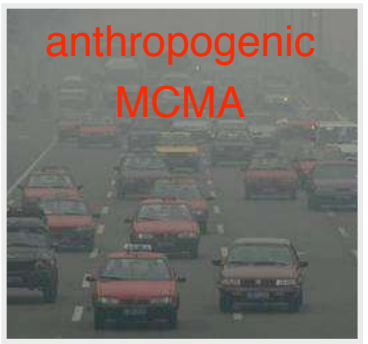
Transport & Aerosol Sources

- WRF (constrained meteorology) + Lagrangian Particle Disperison model
  - *Anthropogenic and biomass burning sources tagged*
  - *Air mass meteorological "age" computed*
- Used to determine favorable transport periods and aerosol sources





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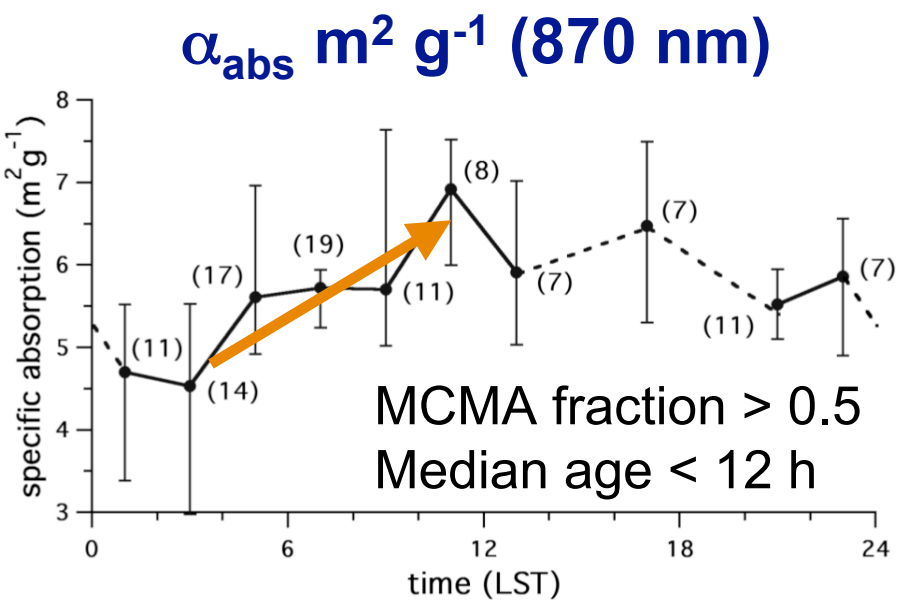
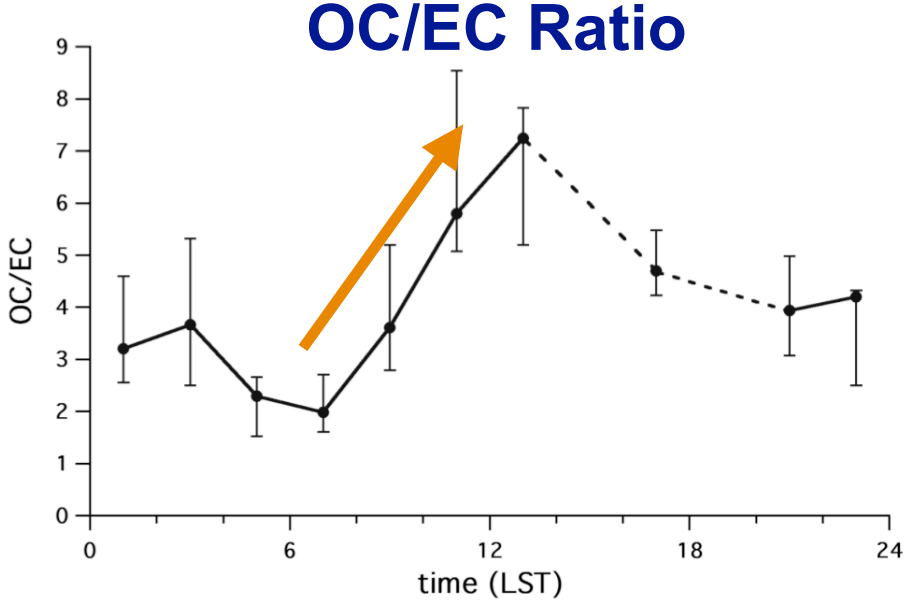
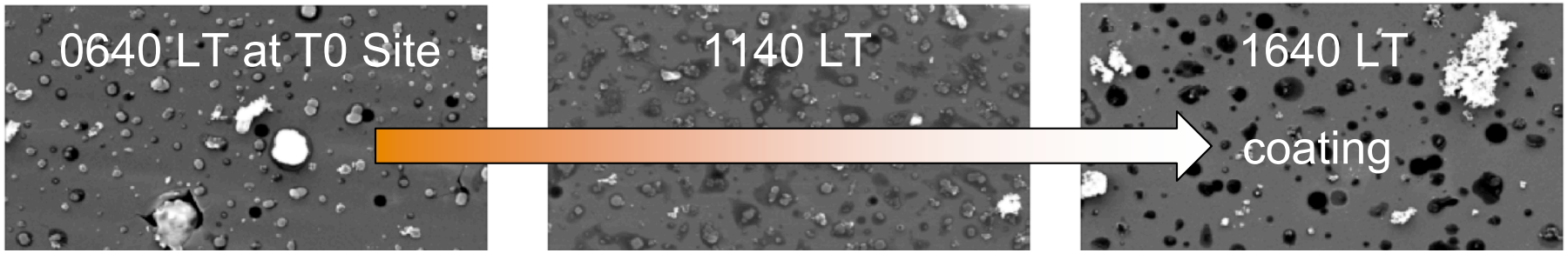
Specific Absorption at T1





- Consistent with expectation of rapid soot aging and coating
- Baumgardner et al. (2007) found α_{abs} varied little during day



samples provided by Alex Laskin

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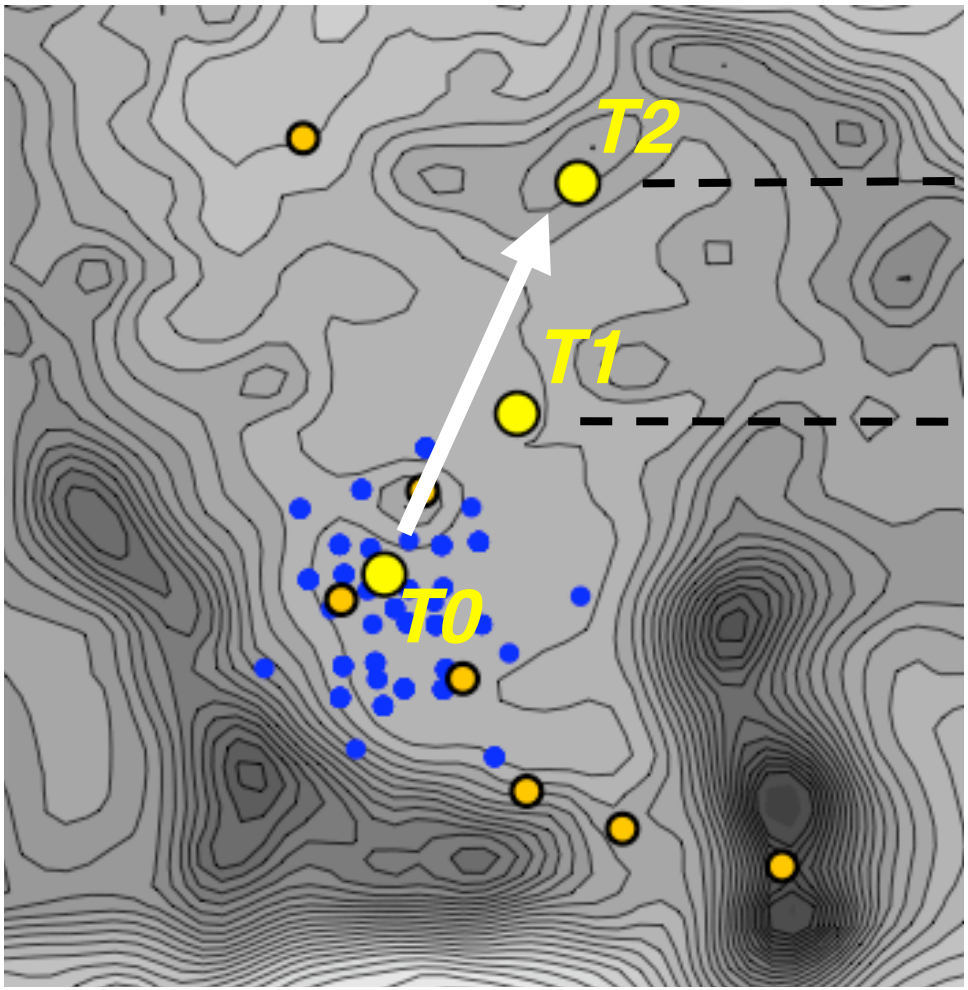
Specific Absorption during Transport

Coating Occuring Downwind?



Median α_{abs} m^2 g^{-1}

Transport Periods	Non-Transport Periods
5.97	5.41
5.72	5.61

Difference is only weakly statistically significant (few cases)

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Discussion

- Do **climate models** adequately represent changes in α_{abs} downwind of anthropogenic sources?
- **Longer sampling period** needed to obtain more significant statistics
- Modeling, constrained by observed meteorology, useful to help identify **periods of transport** between surface sites and **air mass age**
- Modeling can also identify sources, but other data such as AMS organic spectra should also be used to identify periods dominated by **biomass burning**
- Over the past year, AMS organic spectra data has become available from multiple sites